

between 20 and 35 percent by weight (between 10 and 25 mol percent) of a forsterite phase consisting of Mg_2SiO_4 .

Remarks

Claims 1-6, 13-14 & 19-20 are pending. Claims 7-12 were cancelled following an earlier restriction requirement. Claims 15-18 are withdrawn following a recent restriction requirement. Claims 3, 4, and 6 are allowed. Claims 1, 2, 5, 13, 14, 19 & 20 are rejected. Re-examination and reconsideration are requested.

The following headings reflect those used in the Office Action to which this document is responsive.

Election/Restrictions

On page 2 of the Office Action, the Examiner states that "Claims 13-18 stand withdrawn. . . ." Applicant interprets this as "Claims 15-18 . . .".

Applicant respectfully requests reconsideration and examination of claims 15-18 ("a high operating temperature sealed assembly") in light of the following comments. They should be reinstated because as now amended it cannot be said that they are "independent and distinct inventions [from Group I (a "glass matrix composition for a high operating temperature sealed assembly") within the meaning of 37 C.F.R. § 1.142.

The preamble of claim 15 resembles that of claim 1: "a high operating temperature sealed assembly . . ." (claim 15) and "a glass matrix composition for a high operating temperature sealed assembly in ceramic electrolyte electrochemical conversion devices" (claim 1); the claimed ranges of SiO_2 and BaO overlap; and the MgO range of claim 15 is commensurate with that of claim 3. At best, they are but different species of the same invention.

Claim Rejections- 35 U.S.C. § 112

Claims 1, 2, 5, 19 & 20 are rejected under 35 U.S.C. § 112, ¶ 1 as failing to comply with the written description requirement.

The Examiner states that claims 1, 2, 5, 19 & 20 currently recite “. . . the matrix composition remaining in a glassy state after sealing at temperatures up to 1200°C”, and that these claims “contain subject matter which was not described in the Specification . . .”

Applicant respectfully disagrees: The x-ray diffraction image in Figure 3 shows an arched baseline. This indicates the presence of a non-crystalline (i.e., glassy) phase. Further, discussing example 2, the Specification describes: “. . . the preparation and use of the inventive glass composition in sealing a SOFC structure. The matrix glass is prepared from fine silica, barium carbonate and magnesium oxide as in Example 1, . . . This matrix glass is melted at 1555°C . . .” Specification, 15:20-25. This means crystalline forsterite and the “glassy” glass matrix. Nevertheless, to expedite prosecution, the limitation of “. . . remaining in a glassy state after sealing at temperatures up to 1200°C” has been deleted in claim 1.

Claims 2 and 5 rise or fall with claim 1.

As to claims 1, 2, 5, 19 & 20, the Specification states that the invention “relates to a composition of matter where use as glassy matrix for sealing materials in gas-tight structures of solid oxide fuel cells . . .” Specification, 1:6-8. The phrase “for use” requires that the glassy matrix remain in that state in operational use, i.e., sealing at elevated temperatures. Examples 6 and 7 give other ceramic electrolyte electrochemical conversion devices.

On page 3 of the Office Action, the Examiner observes that “there is no description that the glass alone (as in claims 1, 2 & 5) can be sealed to an SOFC”. Applicant interprets this as “there is no description that the composition of matter alone”.

Supporting description for the composition of matter in this use can be found in, e.g., Example 1, Specification, pp. 14-15.

The Examiner stated that he was unable to find support in the Specification as originally filed for the limitation found in claims 14, 19 & 20 that the composition contains 15-40 or 20-35 weight percent Mg_2SiO_4 . Support lies in the Specification at Figure 1b (e.g. calculating the composition with an end-number composition at position no. 5, which is forsterite).

For these reasons, the rejection of claims 1, 2, 5, 14, 19 & 20 under 35 U.S.C. § 112, ¶ 1 should be rescinded.

Claim Rejections - 35 U.S.C. § 103

Claims 1, 5, & 13 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Morrissey et al. (U.S. Patent No. 3,022,179). The Examiner states that Morrissey has “overlapping ranges of components with the glass of the present invention”.

The Examiner is correct in noting that “the instant claims employ ‘consisting essentially of’ language”. He states that “there is nothing of record to suggest that components such as Al_2O_3 or MgF_2 would materially affect the novel or basic characteristics of the present composition.”

The Lahl publication is incorporated by reference. Specification, 5:27-31. That reference distinguishes devitrifying glasses from glasses which remain glassy. Lahl's conclusion (p. 1065) states that:

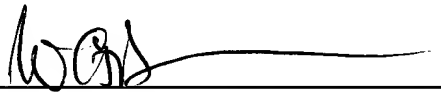
“Extensive investigations of MgO containing glasses with different Al_2O_3 concentrations as well as with and without nucleating agents were carried out. They showed that the detrimental formation of the $\text{Mg}_2\text{Al}_{14}\text{Si}_5\text{O}_{18}$ phase present in these sealants can be suppressed using low Al_2O_3 concentrations

as well as appropriate grain sizes and nucleating agents.”
(emphasis added.)

Lahl tested aluminum concentrations in the range of 5 to 12.8 wt percent. There is no reasonable way to conclude that 12 wt. percent would be anything other than a high amount of aluminum and therefore detrimental. This observation is therefore of record. It suggests that components other than those following the transitional phrase “consisting essentially of” would materially affect the novel or basic characteristics (for example, suitability for use) of the claimed composition.

All formal and substantive requirements of patentability are now met. Accordingly, a Notice of Allowance of all pending claims is respectfully requested. If a telephone call would expedite prosecution, the Examiner is invited to contact the undersigned.

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